

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, of claims in the application:

LISTING OF CLAIMS

- 1 1. (Original) A method of automatically subscribing a network device to a plurality of
2 events applicable to a logical group of which the network device is a member,
3 comprising the computer-implemented steps of:
4 creating and storing a mapping that associates a plurality of network devices with the
5 logical group and that associates the logical group with one or more events
6 that can pass over an event bus to which the network device is logically
7 coupled;
8 receiving a device identifier of one of the network devices in the logical group;
9 receiving an event that is among the one or more events that are in the mapping;
10 based on the mapping, sending information to the network device that causes the
11 network device to receive all events that are associated in the mapping with
12 the logical group in which the network device participates.
- 1 2. (Original) A method as recited in Claim 1, wherein sending information to the
2 network device that causes the network device to receive all events comprises the
3 steps of subscribing the network device to all the events that are in the mapping and
4 associated with the network device at an event gateway that is coupled to the event
5 bus.
- 1 3. (Original) A method as recited in Claim 1, further comprising the steps of receiving
2 application-specific mapping information from an application program and updating
3 the mapping using the application-specific mapping information.

1 4. (Original) A method as recited in Claim 2, further comprising the steps of receiving
2 application-specific mapping information from an application program in XML
3 format using a data access component that transforms the application-specific
4 mapping information from XML format into a canonical object model format.

1 5. (Original) The method as recited in Claim 1, wherein the step of creating and storing
2 ~~a mapping~~ comprises the steps of receiving information identifying the mapping in a
3 data store that associates the plurality of network devices with the logical group and
4 that associates the logical group with the one or more events ~~that can pass over an~~
5 ~~event bus to which the network device is logically coupled.~~

1 6. (Original) A method as recited in Claim 1, wherein sending information to the
2 network device that causes the network device to receive all events comprises the
3 steps of generating, based on the mapping, a list of all the events that are in the
4 mapping and associated with the network device, and sending the list to an event
5 gateway that is coupled to the event bus.

1 7. (Original) A method as recited in Claim 1, wherein the mapping comprises an
2 association of stored values that identify for each network device, an application, a
3 group identifier, an event of the one or more events, a network device identifier, one
4 or more published events, and one or more subscribed events.

1 8. (Original) A method as recited in Claim 1, wherein sending information to the
2 network device that causes the network device to receive all events comprises the
3 steps of:

4 receiving a call from a calling application program to a Resolve method, wherein the
5 call includes one or more selection criteria selected from among device
6 identifier, event subject, or action desired;
7 generating, based on the mapping, a list of all the events that are in the mapping and
8 associated with the network device based on the selection criteria;
9 returning the list to the calling application program.

1 9. (Original) A method as recited in Claim 1, further comprising the steps of creating
2 and storing the mapping using a plurality of programmatic objects that conform to an
3 object model consisting of: a group item class, wherein each group item object
4 instantiated from the group item class may comprise one or more group objects that
5 are instantiated from a group class or one or more device objects that are instantiated
6 from a device class; one or more application objects that are instantiated based on an
7 application class; and one or more event objects that are instantiated based on an
8 event class.

1 10. (Original) A method as recited in Claim 1, further comprising the steps of:
2 creating and storing the mapping using a plurality of programmatic objects that
3 conform to an object model consisting of: a group item class, wherein each
4 group item object instantiated from the group item class may comprise one or
5 more group objects that are instantiated from a group class or one or more
6 device objects that are instantiated from a device class; one or more
7 application objects that are instantiated based on an application class; and one
8 or more event objects that are instantiated based on an event class;
9 for one of the event objects, creating and storing one or more subject values that
10 associate an original event subject with the event object, a subscribed mapping

11 attribute value that specifies one or more subscribe events, and a publisher
12 mapping attribute value that specifies one or more publish events.

1 11. (Original) A method as recited in Claim 1, wherein the specified call time value
2 represents a disconnect time associated with the packet flow.
3 creating and storing the mapping using a plurality of programmatic objects that
4 conform to an object model consisting of: a group item class, wherein each
5 group item object instantiated from the group item class may comprise one or
6 more group objects that are instantiated from a group class or one or more
7 device objects that are instantiated from a device class; one or more
8 application objects that are instantiated based on an application class; and one
9 or more event objects that are instantiated based on an event class;
10 for one of the application objects, creating and storing one or more event attribute
11 values that associate event objects with the application object, a name attribute
12 value that specifies a unique name of the application, and one or more item
13 attribute values that associate one or more group items with the application.

1 12. (Original) A method as recited in Claim 1, further comprising the steps of:
2 creating and storing the mapping using a plurality of programmatic objects that
3 conform to an object model consisting of: a group item class, wherein each
4 group item object instantiated from the group item class may comprise one or
5 more group objects that are instantiated from a group class or one or more
6 device objects that are instantiated from a device class; one or more
7 application objects that are instantiated based on an application class; and one
8 or more event objects that are instantiated based on an event class;

9 for one of the event objects, creating and storing one or more subject values that
10 associate an original event subject with the event object, a subscribed mapping
11 attribute value that specifies one or more subscribe events, a publisher
12 mapping attribute value that specifies one or more publish events, and a
13 subscribed default flag value that indicates whether an external computation is
14 carried out to determine the subscribe events.

1 13. (Original) A method as recited in Claim 12, further comprising the steps of
2 determining whether the subscribed default flag value is clear, and if so, sending
3 information to the network device that causes the network device to receive all events
4 that are associated in the mapping with the logical group in which the network device
5 participates.

1 14. (Original) A method as recited in Claim 12, further comprising the steps of
2 determining whether the subscribed default flag value is set, and if so, sending
3 information to the network device that causes the network device to receive one or
4 more events based on computing a new list of events using an external algorithm.

1 15. (Original) A method as recited in Claim 1, wherein receiving a device identifier
2 comprises receiving a subscribe request that includes a router identifier for one of the
3 network devices in the logical group and an event identifier.

1 16. (Original) A method as recited in Claim 15, wherein sending information to the
2 network device that causes the network device to receive all events that are associated
3 in the mapping with the logical group in which the network device participates

4 ordering comprises looking up the router identifier and the event identifier in the
5 mapping and receiving a subject list in response thereto.

1 17. (Original) A method as recited in Claim 15, wherein sending information to the
2 network device that causes the network device to receive all events that are associated
3 in the mapping with the logical group in which the network device participates
4 ordering comprises looking up the router identifier and the event identifier in the
5 mapping, receiving a subject list in response thereto, and applying the subject list to
6 the network device at the event gateway.

1 18. (Original) A method as recited in Claim 1, wherein receiving athe device identifier
2 comprises receiving a publish request that includes a router identifier for one of the
3 network devices in the logical group or a group identifier of the logical group, and an
4 event identifier.

1 19. (Original) A method as recited in Claim 18, wherein sending information to the
2 network device that causes the network device to receive all events that are associated
3 in the mapping with the logical group in which the network device participates
4 ordering comprises looking up the router identifier, or the group identifier, and the
5 event identifier in the mapping and receiving a subject list in response thereto.

1 20. (Original) A method as recited in Claim 18, wherein sending information to the
2 network device that causes the network device to receive all events that are associated
3 in the mapping with the logical group in which the network device participates
4 ordering comprises looking up the router identifier, or the group identifier, and the

5 event identifier in the mapping, receiving a subject list in response thereto, and
6 applying the subject list to the network device at the event gateway.

1 21. (Original) A method of automatically subscribing a router in a network to a plurality
2 of events applicable to a logical group of which the router is a member, comprising
3 the computer-implemented steps of:
4 creating and storing a mapping that associates a plurality of routers with the logical
5 group and that associates the logical group with one or more events that can
6 pass over an event bus to which the router communicates;
7 receiving a subscribe request from the router that includes a router identifier that
8 uniquely identifies the router and an event identifier;
9 looking up the router identifier and the event identifier in the mapping;
10 receiving a subject list in response thereto, wherein the subject list identifies all
11 subjects to which the router should subscribe;
12 sending information to the event bus that requests the event bus to subscribe the
13 router to all events in the subject list.

1 22. (Original) A computer-readable medium carrying one or more sequences of
2 instructions for automatically subscribing a network device to a plurality of events
3 applicable to a logical group of which the network device is a member, which
4 instructions, when executed by one or more processors, cause the one or more
5 processors to carry out the steps of:
6 creating and storing a mapping that associates a plurality of network devices with the
7 logical group and that associates the logical group with one or more events
8 that can pass over an event bus to which the network device is logically
9 coupled;

receiving a device identifier of one of the network devices in the logical group;
receiving an event that is among the one or more events that are in the mapping;
based on the mapping, sending information to the network device that causes the
network device to receive all events that are associated in the mapping with
the logical group in which the network device participates.

23. (Original) An apparatus for automatically subscribing a network device to a plurality
of events applicable to a logical group of which the network device is a member,
comprising:
means for creating and storing a mapping that associates a plurality of network
devices with the logical group and that associates the logical group with one
or more events that can pass over an event bus to which the network device is
logically coupled;
means for receiving a device identifier of one of the network devices in the logical
group;
means for receiving an event that is among the one or more events that are in the
mapping;
means for, based on the mapping, sending information to the network device that
causes the network device to receive all events that are associated in the
mapping with the logical group in which the network device participates.

24. (Original) An apparatus for automatically subscribing a network device to a plurality
of events applicable to a logical group of which the network device is a member,
comprising:
a network interface that is coupled to the data network for receiving one or more
packet flows therefrom;

6 a processor;
7 one or more stored sequences of instructions which, when executed by the processor,
8 cause the processor to carry out the steps of:
9 creating and storing a mapping that associates a plurality of network devices
10 with the logical group and that associates the logical group with one or
11 more events that can pass over an event bus to which the network
12 device is logically coupled;
13 receiving a device identifier of one of the network devices in the logical
14 group;
15 receiving an event that is among the one or more events that are in the
16 mapping;
17 based on the mapping, sending information to the network device that causes
18 the network device to receive all events that are associated in the
19 mapping with the logical group in which the network device
20 participates.

1 25. (New) The computer-readable medium recited in Claim 22, wherein sending
2 information to the network device that causes the network device to receive all events
3 comprises the steps of subscribing the network device to all the events that are in the
4 mapping and associated with the network device at an event gateway that is coupled
5 to the event bus.

1 26. (New) The computer-readable medium recited in Claim 22, wherein the method
2 further comprises the steps of receiving application-specific mapping information
3 from an application program and updating the mapping using the application-specific
4 mapping information.

- 1 27. (New) The computer-readable medium recited in Claim 25, wherein the method
2 further comprises the steps of receiving application-specific mapping information
3 from an application program in XML format using a data access component that
4 transforms the application-specific mapping information from XML format into a
5 canonical object model format.
- 1 28. (New) The computer-readable medium recited in Claim 22, wherein the step of
2 creating and storing comprises the step of receiving information identifying the
3 mapping in a data store that associates the plurality of network devices with the
4 logical group and that associates the logical group with the one or more events.
- 1 29. (New) The computer-readable medium recited in Claim 22, wherein sending
2 information to the network device that causes the network device to receive all events
3 comprises the steps of generating, based on the mapping, a list of all the events that
4 are in the mapping and associated with the network device, and sending the list to an
5 event gateway that is coupled to the event bus.
- 1 30. (New) The method recited in Claim 22, wherein the mapping comprises an
2 association of stored values that identify for each network device, an application, a
3 group identifier, an event of the one or more events, a network device identifier, one
4 or more published events, and one or more subscribed events.
- 1 31. (New) The computer-readable medium recited in Claim 22, wherein sending
2 information to the network device that causes the network device to receive all events
3 comprises the steps of:

4 receiving a call from a calling application program to a Resolve method, wherein the
5 call includes one or more selection criteria selected from among device
6 identifier, event subject, or action desired;
7 generating, based on the mapping, a list of all the events that are in the mapping and
8 associated with the network device based on the selection criteria;
9 returning the list to the calling application program.

1 32. (New) The computer-readable medium recited in Claim 22, wherein the method
2 further comprises the steps of creating and storing the mapping using a plurality of
3 programmatic objects that conform to an object model consisting of: a group item
4 class, wherein each group item object instantiated from the group item class may
5 comprise one or more group objects that are instantiated from a group class or one or
6 more device objects that are instantiated from a device class; one or more application
7 objects that are instantiated based on an application class; and one or more event
8 objects that are instantiated based on an event class.

1 33. (New) The computer-readable medium recited in Claim 22, wherein the method
2 further comprises the steps of:
3 creating and storing the mapping using a plurality of programmatic objects that
4 conform to an object model consisting of: a group item class, wherein each
5 group item object instantiated from the group item class may comprise one or
6 more group objects that are instantiated from a group class or one or more
7 device objects that are instantiated from a device class; one or more
8 application objects that are instantiated based on an application class; and one
9 or more event objects that are instantiated based on an event class;

for one of the event objects, creating and storing one or more subject values that
associate an original event subject with the event object, a subscribed mapping
attribute value that specifies one or more subscribe events, and a publisher
mapping attribute value that specifies one or more publish events.

34. (New) The computer-readable medium recited in Claim 22, wherein the specified call
time value represents a disconnect time associated with the packet flow.

creating and storing the mapping using a plurality of programmatic objects that
conform to an object model consisting of: a group item class, wherein each
group item object instantiated from the group item class may comprise one or
more group objects that are instantiated from a group class or one or more
device objects that are instantiated from a device class; one or more
application objects that are instantiated based on an application class; and one
or more event objects that are instantiated based on an event class;
for one of the application objects, creating and storing one or more event attribute
values that associate event objects with the application object, a name attribute
value that specifies a unique name of the application, and one or more item
attribute values that associate one or more group items with the application.

35. (New) The computer-readable medium recited in Claim 22, wherein the method
further comprises the steps of:
creating and storing the mapping using a plurality of programmatic objects that
conform to an object model consisting of: a group item class, wherein each
group item object instantiated from the group item class may comprise one or
more group objects that are instantiated from a group class or one or more
device objects that are instantiated from a device class; one or more

8 application objects that are instantiated based on an application class; and one
9 or more event objects that are instantiated based on an event class;
10 for one of the event objects, creating and storing one or more subject values that
11 associate an original event subject with the event object, a subscribed mapping
12 attribute value that specifies one or more subscribe events, a publisher
13 mapping attribute value that specifies one or more publish events, and a
14 subscribed default flag value that indicates whether an external computation is
15 carried out to determine the subscribe events.

1 36. (New) The computer-readable medium recited in Claim 35, wherein the method
2 further comprises the steps of determining whether the subscribed default flag value
3 is clear, and if so, sending information to the network device that causes the network
4 device to receive all events that are associated in the mapping with the logical group
5 in which the network device participates.

1 37. (New) The computer-readable medium recited in Claim 35, wherein the method
2 further comprises the steps of determining whether the subscribed default flag value
3 is set, and if so, sending information to the network device that causes the network
4 device to receive one or more events based on computing a new list of events using
5 an external algorithm.

1 38. (New) The computer-readable medium recited in Claim 22, wherein receiving a
2 device identifier comprises receiving a subscribe request that includes a router
3 identifier for one of the network devices in the logical group and an event identifier.

- 1 39. (New) The computer-readable medium recited in Claim 38, wherein sending
2 information to the network device that causes the network device to receive all events
3 that are associated in the mapping with the logical group in which the network device
4 participates ordering comprises looking up the router identifier and the event
5 identifier in the mapping and receiving a subject list in response thereto.
- 1 40. (New) The computer-readable medium recited in Claim 38, wherein sending
2 information to the network device that causes the network device to receive all events
3 that are associated in the mapping with the logical group in which the network device
4 participates ordering comprises looking up the router identifier and the event
5 identifier in the mapping, receiving a subject list in response thereto, and applying the
6 subject list to the network device at the event gateway.
- 1 41. (New) The computer-readable medium recited in Claim 22, wherein receiving the
2 device identifier comprises receiving a publish request that includes a router identifier
3 for one of the network devices in the logical group or a group identifier of the logical
4 group, and an event identifier.
- 1 42. (New) The computer-readable medium recited in Claim 41, wherein sending
2 information to the network device that causes the network device to receive all events
3 that are associated in the mapping with the logical group in which the network device
4 participates ordering comprises looking up the router identifier, or the group
5 identifier, and the event identifier in the mapping and receiving a subject list in
6 response thereto.

1 43. (New) The computer-readable medium recited in Claim 41, wherein sending
2 information to the network device that causes the network device to receive all events
3 that are associated in the mapping with the logical group in which the network device
4 participates ordering comprises looking up the router identifier, or the group
5 identifier, and the event identifier in the mapping, receiving a subject list in response
6 thereto, and applying the subject list to the network device at the event gateway.

1 44. (New) The apparatus recited in Claim 24, wherein sending information to the network
2 device that causes the network device to receive all events comprises the steps of
3 subscribing the network device to all the events that are in the mapping and
4 associated with the network device at an event gateway that is coupled to the event
5 bus.

1 45. (New) The apparatus recited in Claim 24, wherein the method further comprises the
2 steps of receiving application-specific mapping information from an application
3 program and updating the mapping using the application-specific mapping
4 information.

1 46. (New) The apparatus recited in Claim 44, wherein the method further comprises the
2 steps of receiving application-specific mapping information from an application
3 program in XML format using a data access component that transforms the
4 application-specific mapping information from XML format into a canonical object
5 model format.

1 47. (New) The apparatus recited in Claim 24, wherein the step of creating and storing
2 comprises the step of receiving information identifying the mapping in a data store

3 that associates the plurality of network devices with the logical group and that
4 associates the logical group with the one or more events.

1 48. (New) The apparatus recited in Claim 24, wherein sending information to the network
2 device that causes the network device to receive all events comprises the steps of
3 generating, based on the mapping, a list of all the events that are in the mapping and
4 associated with the network device, and sending the list to an event gateway that is
5 coupled to the event bus.

1 49. (New) The apparatus recited in Claim 24, wherein the mapping comprises an
2 association of stored values that identify for each network device, an application, a
3 group identifier, an event of the one or more events, a network device identifier, one
4 or more published events, and one or more subscribed events.

1 50. (New) The apparatus recited in Claim 24, wherein sending information to the network
2 device that causes the network device to receive all events comprises the steps of:
3 receiving a call from a calling application program to a Resolve method, wherein the
4 call includes one or more selection criteria selected from among device
5 identifier, event subject, or action desired;
6 generating, based on the mapping, a list of all the events that are in the mapping and
7 associated with the network device based on the selection criteria;
8 returning the list to the calling application program.

1 51. (New) The apparatus recited in Claim 24, wherein the method further comprises the
2 steps of creating and storing the mapping using a plurality of programmatic objects
3 that conform to an object model consisting of: a group item class, wherein each group

4 item object instantiated from the group item class may comprise one or more group
5 objects that are instantiated from a group class or one or more device objects that are
6 instantiated from a device class; one or more application objects that are instantiated
7 based on an application class; and one or more event objects that are instantiated
8 based on an event class.

1 52. (New) The apparatus recited in Claim 24, wherein the method further comprises the
2 steps of:

3 creating and storing the mapping using a plurality of programmatic objects that

4 conform to an object model consisting of: a group item class, wherein each
5 group item object instantiated from the group item class may comprise one or
6 more group objects that are instantiated from a group class or one or more
7 device objects that are instantiated from a device class; one or more
8 application objects that are instantiated based on an application class; and one
9 or more event objects that are instantiated based on an event class;

10 for one of the event objects, creating and storing one or more subject values that

11 associate an original event subject with the event object, a subscribed mapping
12 attribute value that specifies one or more subscribe events, and a publisher
13 mapping attribute value that specifies one or more publish events.

1 53. (New) The apparatus recited in Claim 24, wherein the specified call time value
2 represents a disconnect time associated with the packet flow.

3 creating and storing the mapping using a plurality of programmatic objects that

4 conform to an object model consisting of: a group item class, wherein each
5 group item object instantiated from the group item class may comprise one or
6 more group objects that are instantiated from a group class or one or more

7 device objects that are instantiated from a device class; one or more
8 application objects that are instantiated based on an application class; and one
9 or more event objects that are instantiated based on an event class;
10 for one of the application objects, creating and storing one or more event attribute
11 values that associate event objects with the application object, a name attribute
12 value that specifies a unique name of the application, and one or more item
13 attribute values that associate one or more group items with the application.

1 54. (New) The apparatus recited in Claim 24, wherein the method further comprises the
2 steps of:
3 creating and storing the mapping using a plurality of programmatic objects that
4 conform to an object model consisting of: a group item class, wherein each
5 group item object instantiated from the group item class may comprise one or
6 more group objects that are instantiated from a group class or one or more
7 device objects that are instantiated from a device class; one or more
8 application objects that are instantiated based on an application class; and one
9 or more event objects that are instantiated based on an event class;
10 for one of the event objects, creating and storing one or more subject values that
11 associate an original event subject with the event object, a subscribed mapping
12 attribute value that specifies one or more subscribe events, a publisher
13 mapping attribute value that specifies one or more publish events, and a
14 subscribed default flag value that indicates whether an external computation is
15 carried out to determine the subscribe events.

1 55. (New) The apparatus recited in Claim 54, wherein the method further comprises the
2 steps of determining whether the subscribed default flag value is clear, and if so,

3 sending information to the network device that causes the network device to receive
4 all events that are associated in the mapping with the logical group in which the
5 network device participates.

1 56. (New) The apparatus recited in Claim 54, wherein the method further comprises the
2 steps of determining whether the subscribed default flag value is set, and if so,
3 sending information to the network device that causes the network device to receive
4 one or more events based on computing a new list of events using an external
5 algorithm.

1 57. (New) The apparatus recited in Claim 24, wherein receiving a device identifier
2 comprises receiving a subscribe request that includes a router identifier for one of the
3 network devices in the logical group and an event identifier.

1 58. (New) The apparatus recited in Claim 57, wherein sending information to the network
2 device that causes the network device to receive all events that are associated in the
3 mapping with the logical group in which the network device participates ordering
4 comprises looking up the router identifier and the event identifier in the mapping and
5 receiving a subject list in response thereto.

1 59. (New) The apparatus recited in Claim 57, wherein sending information to the network
2 device that causes the network device to receive all events that are associated in the
3 mapping with the logical group in which the network device participates ordering
4 comprises looking up the router identifier and the event identifier in the mapping,
5 receiving a subject list in response thereto, and applying the subject list to the
6 network device at the event gateway.

1 60. (New) The apparatus recited in Claim 24, wherein receiving the device identifier
2 comprises receiving a publish request that includes a router identifier for one of the
3 network devices in the logical group or a group identifier of the logical group, and an
4 event identifier.

1 61. (New) The apparatus recited in Claim 60, wherein sending information to the network
2 device that causes the network device to receive all events that are associated in the
3 mapping with the logical group in which the network device participates ordering
4 comprises looking up the router identifier, or the group identifier, and the event
5 identifier in the mapping and receiving a subject list in response thereto.

1 62. (New) The apparatus recited in Claim 60, wherein sending information to the network
2 device that causes the network device to receive all events that are associated in the
3 mapping with the logical group in which the network device participates ordering
4 comprises looking up the router identifier, or the group identifier, and the event
5 identifier in the mapping, receiving a subject list in response thereto, and applying the
6 subject list to the network device at the event gateway.

1 63. A network comprising:
2 the apparatus of claim 24;
3 the network device;
4 the logical group; and
5 one or more devices that generate the plurality of events.

1 64. A computer-readable medium carrying a mapping service client Application Program
2 Interface (API) comprising: instructions for a set of invokable operations that allow a client
3 application programs access to a mapping service runtime, wherein the invokable operations
4 including at least
5 an attach operation that allows the client to open a persistent connection to the
6 mapping service runtime, the attach operation receives one parameter, having
7 at least an application context that is used to determine a mechanism available
8 to the client;
9 a detach operation that tears down the persistent connection created by the attach
10 operation;
11 an open operation that creates one or more non-persistent channels within the
12 connection that is created by the attach operation;
13 a close operation that terminates the one or more non-persistent channels that are
14 created by the open operation; and
15 a resolve operation that returns to the client a set of events,
16 wherein the set of events is a combination of zero or more publish events and
17 zero or more subscribe events,
18 wherein the combination included in the set of events returned by the resolve
19 operation is based on a specified selection criteria, and
20 wherein the selection criteria includes at least a device identification, an event
21 subject, and an action desired; and
22 wherein the mapping runtime service causes the client to receive all events that are
23 associated with a logical group that includes the client, without the client
24 having to store a list of the logical groups in which the client participates and
25 without having to know what events pertain to the client or the logical groups.